Human Dolphin Interactions on the West Coast of Florida: Documentation from MML's Marine Mammal Response Program

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INTRODUCTION

Understanding of human and marine mammal interactions are presently hampered by a lack of definitive data (Hare and Mead 1987). Entanglement in fishing gear, ingestion of marine debris, harassment, vessel collisions, and pollution-induced stress are but a few of the visible interactions detrimental to marine mammals. Although documentation is sketchy, these impacts cannot be assumed to be negligible while human use of coastal ocean resources is increasing.

Mote Marine Laboratory's (MML) Marine Mammal Program is authorized under Section 109 of the Marine Mammal Protection Act, the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service Southeast Region to assist in the operation of the U.S. Marine Mammal Stranding Network as a "Participant". Since the inception of MML's Stranding Response involvement in 1984, we have responded to 116 cetacean strandings. Of these, 15 cases involving bottlenose dolphins were found to be suspicious of human interaction. These include evidence of net entanglement, gunshot, stabbings, and boat collisions.

EXAMPLES OF HUMAN AND CETACEAN INTERACTIONS

A. Fishing Gear

1. Net Entanglement

Net entanglement of marine mammals is geographically and taxonomically widespread (Hare and Mead 1987). It is difficult to determine events occurring at sea which involve set nets or marine debris from examination of beached animals found with netting.

When dolphins are caught in a net they may escape, dragging a portion of the net with them, or they may be cut out of the net by fishermen with portions of the net still intact. Marks left by nets are typically located on the peduncle and flipper joints, emphasized by swimming and struggling motions. When a dolphin is caught in a stationary net such as a gill net, it may be able to force its way under the lead line, which then tends to entangle the caudal flukes, leaving telltale marks (Jay Gorzelany, pers. comm.)

Dolphins presumably must struggle in a net in order to cause monofilament or other material to slice the skin. The marks caused by monofilament nets are small thin cuts 0.1-2 cm into the epidermis on appendages, dorsoventrally on the caudal peduncle, or on the rostrum (Hare and Mead 1987). Netting may leave impressions instead of or in addition to cuts, particularly around the neck or snout.

Other marks associated with stationary net incidental take are gaff marks (deep slashes or punctures, usually on the anterior dorsolateral section), excised appendages, and slit abdominal cavities (presumably intended to make carcasses sink). The possibility that any of these marks could be post-mortem, when the animal is found dead-stranded on a beach, hampers their singular use

as evidence of net entanglement. Dismemberments and knife cuts can be differentiated between human induced and shark predation, but the time and place of injury is virtually impossible to determine.

Most of these guidelines are based on entangled harbor porpoise with very few corroborative observations on fishing operations (Hare and Mead 1987). Marks left by entanglement will vary between each fisherman and fishing method, different net meshes, and different species of cetacean caught. Fishing methods change and fishermen may alter their behavior to hide evidence of entanglement.

2. Other Fishing Gear

Incidental catch of cetaceans in fishing gear other than standing nets has been reported from varying geographic areas of the United States (Hare and Mead 1987). These events are related to the type of fishery practiced, and include encounters with herring weirs, cod and squid traps, salmon, mackerel, and groundfish nets, tuna long-lines, and mooring and lobster pot buoys.

Ropes and lines inflict a more concentrated force than netting, so that a wound is much more likely to result. Cuts, abrasions, and scars from rope damage can occur anywhere on the body but are typically found around the caudal peduncle and on the head near the mouth. The caudal peduncle tends to catch and hold rope which creates abrasions dorsoventrally on the peduncle and/or medially on the tail flukes near the juncture of these two structures. This area is also where rope tows are employed.

3. Debris

While it is difficult to distinguish between stationary fishing net debris which entangled an animal from that which was picked up as flotsam, it can be expected that the acuteness of embedded line cutting into the skin is proportional to the amount of swimming or struggling undergone after entanglement. Severe encroachment can result in necrosis and potential death due to infection.

B. Ingestion

Ingestion of debris and its affects on marine mammals is not well documented or understood.

C. Wounds

1. Gunshot Wounds

Gunshot wounds are commonly reported but infrequently documented or confirmed by retrieval of the projectile (Hare and Mead 1987). It is difficult to differentiate between pre- and post-mortem gunshot, and decomposition and the work of scavengers can further obscure the area of the wound.

2. Other Wounds

Wounds caused by knives, gaffs, and other bludgeoning instruments have been discussed previously, as they are often associated with fishery interactions. Difficulty arises in contributing these wounds to cause of death because they are just as likely to be inflicted post-mortem on a stranded animal.

D. Vessel Collision

Vessel collisions can leave characteristic propeller slashes or blunt trauma from bow impact. Skeg marks (scrapes made from the propeller guard on outboard engines) may also be present. Propeller slashes vary in appearance depending on the speed of the boat, the size of the propeller, and the posture and speed of the animal when hit. These wounds typically have several to many parallel slashes of varying length in which the length of each slash is related to its depth. Distance between slashes tends to be constant and related to the size and pitch of the propeller.

Location and appearance of a boat collision wound can help determine if the collision occurred pre- or post-mortem. Dolphins do not typically expose their underside to the surface where it would be vulnerable to boats. Thus, pre-mortem propeller wounds would not be expected to be found on the belly.

FLORIDA WEST COAST FISHERY METHODS

Although there are few reports of interaction between fisheries and marine mammals in the Gulf of Mexico, the bottlenose dolphin (Tursiops truncatus) is involved in gear conflicts throughout the area (Northridge 1984). *T. truncatus* is one of the three most common cetacean species in the Gulf, whose waters of 183m or less may support an estimated 35,000 to 45,000 animals (Scott and Hansen 1989). Tagging and behavioral observations in Tampa Bay led Irvine et al. (1979) to estimate a minimum of 300 dolphins in the estuaries between Charlotte Harbor and Crystal River.

The few records of interactions in the southwest Atlantic (between 5°00' and 35°00' N) come from the small scale commercial fisheries of Florida (Northridge 1984). A number of species are taken there by hooks and lines as well as by gill nets. Leatherwood (1979) reports some conflict between sport fishermen and bottlenose dolphins.

Incidents of fishery competition between dolphins and commercial fishermen occur occasionally. Dolphins can rip segments of shrimp or seine nets as they try to remove trapped fish, or they blunder into a tow or handling line and do minor damage while struggling to get free. Commercial fishermen in the Indian and Banana Rivers claim that dolphins cause an estimated $441,000 worth of damage annually to mackerel long lines and trammel nets (Cato and Prochanska 1976). Although the relationship between bottlenose dolphins and fishermen in the Gulf of Mexico appears to be amicable (Shane 1977), incidents of aggression toward bottlenose dolphins occur. These acts of aggression include shootings (Irvine et al. 1979; Schmidly and Shane 1978) and stabbings (MML unpublished data).

The major commercial fishery along the west coast of Florida from Tampa Bay to Charlotte Harbor involves mullet, pompano, mackerel, and bait fish. The method most commonly used is stationary gill netting, with some employment of trammel nets, seine nets, and drift nets.

Gill nets and trammel nets are stationary nets which may be operated at the surface, midwater, or bottom. Gill nets are a single sheet of netting that snare fish by their gills, while trammel nets have 3 layers designed to entangle rather than gill. The type of net used can often be very important in determining the effect on a specific marine mammal. For example, midwater gill nets may be more likely to ensnare and subsequently drown some species than surface nets, where the animal may still be able to breathe. In addition, synthetic nets are more likely to ensnare marine mammals than natural fibers (Northridge 1984). Such netting is stronger and more durable, making it more difficult for an entrapped animal to escape. Fragments that have broken loose can float freely for a considerable length of time. The relative economy of synthetics has resulted in their widespread use.

Seine nets operate by surrounding a large area of water with very long nets and then herding the fish toward the point of capture, often entangling them on the way. The beach seine net is operated from land in shallow water and is usually set from a boat. The net is dragged in and acts as a barrier to fish inside the enclosed area. This type of net is known to catch coastal marine mammals which feed in shallow waters, such as *Tursiops*, which become entangled in the net along with shallow water fish (Northridge 1984).

EVIDENCE OF HUMAN/CETACEAN INTERACTIONS AT MML

MML's documentation of incidental take and human interactions is detailed in Table 1. Corresponding slides are found in Appendix 1. The physical data was compiled during the performance of standardized necropsies by MML's team of biologists, veterinarians, and pathologists.

DISCUSSION

Since 1984, MML's Marine Mammal Program has responded to 116 cetacean strandings. Fifteen of these cases (12.9%) exhibited evidence of human interaction, including net entanglement, rope marks, stabbings, gunshot, and boat collisions. In all but one case, the interaction could not be determined to be directly responsible for the death of the animal. Injuries occurring prior to death could not be definitively proven. Animals with positive evidence of net entanglement tended to have diseases or complications which were concluded to be mortality factors.

The death of dolphin #8915 was directly attributed to human activity. This animal received a deliberate knife stab to the heart, causing massive hemorrhage. Possible monofilament marks on its tail may indicate net entanglement prior to death.

Case #9007 was also determined to be directly related to human activity. The dolphin's underside was slashed open, but a medical examiner could not determine if this injury occurred before or after the animal's death. However,

it was concluded that the dolphin would have had to be immobilized in order for such a powerful wound to have been inflicted, suggesting probable net entanglement. This case was investigated by the National Marine Fishery Service and resulted in the confession of two commercial fishermen that said they found the dolphin dead in their nets and slit its belly open in an effort to sink it. The perpetrators were charged and fined under civil law.

Table 1. MML Documentation of Incidental Take and Human Interactions.

FILE NUMBER	DATE	LOCATION	SLIDE #	DESCRIPTION
8515	6/12/85	South Longboat Key, Gulf of Mexico	8915-03,08,09	Apparent rope marks at junction of tail stock and fluke with additional marks on lower left jaw seem to indicate entanglement. Both lungs blanched and considerable fluid in abdominal cavity.
8516	7/11/85	2045 Gulf of Mexico Drive, Longboat Key, Gulf of Mexico	8516-01	Tail cleanly cut off.
8708	4/28/87	77th Ave & Gulf Drive, Holmes Beach, Gulf of Mexico	Slides available on request	Rope marks on peduncle and anterior of fluke. Apparent monofilament cuts on mandibular epidermis.
8801	1/3/88	Tampa Bay, "the Kitchens" between Alafia River and Bullfrog Creek at Old Beach off end of Beach Road	8801-2	Animal received several gunshots postmortem (22 caliber, #8 measured shot). One gunshot (potentially fatal) couldn't be determined as pre- or post-mortem due to state of advanced decomposition. This wound contained #7 measured shot. The tracks from the shot were grey through the congealed blubber layer and definitely penetrated unmummified (soft) tissue in the left neck area. No powder burns were evident on any of the gunshot wounds.
8803	2/3/88	Floating near New Pass Bridge	8803-18,36	Propeller cuts: 9.5 cm through spinal cord (or process); 8 regularly spaced 4 cm deep propeller cuts on right side anterior of dorsal fin. No determination of pre- or post-mortem injury could be made.

FILE NUMBER	DATE	LOCATION	SLIDE #	DESCRIPTION
8810	6/22/88	Gulf of Mexico, Manatee Co., Longboat Key, Northshore Dr., North of Beach access	8810-15	3 propeller and 1 skeg mark on middle of right side. Bruise from jaw back to flipper including mandibular joint (bilateral). Bruise behind melon. No determination of pre-or post-mortem could be made.
8819	10/21/88	Gulf of Mexico, Manatee Co., Anna Maria Island, Manatee Beach. Lat: 27°20′54" Long: 82°42′52"	8819-05 8819-07 8819-13 8819-23 8819-29 8819-33	Monofilament present around peduncle anterior of fluke, cutting into flesh on dorsum with tissue overgrowth. Fluke erosion as if from mono-filament. Bilateral gape lesions. erosion on palate as if from mono-filament. Severe purulent verminous pneumonia. Heavy lungworm infection.
8822	11/14/88	Gasparilla Sound, Charlotte Co., South side Boca Grande Causeway, East of toll bridge. Lat: 26°49′25" Long: 82°16′13"	8822-33	Extensive lobomycosis. Monofilament entangled in lobomycotic lesions on right and left pectorals. Animal was taken live bud died in transit to MML.
8901	1/7/89	Manatee River, Manatee Co., Bradenton, 59th St. boat ramp. 27°30′12" Long: 82°35′49"	8901-12 8901-13 8901-15 8901-16	Apparent knife marks on dorso-ventral peduncle. Apparent rope mark on peduncle. Net marks on rostrum and mandible. Extensive Bronchopneumonia.
8910	8/24/89	Gulf of Mexico, Anna Maria Island, Holmes Beach, 100 ft south of public pier. Lat: 26°29′10" Long: 82°40′49"	8901-15	Apparent rope mark on right flipper. Right humerus broken at epiphysis. Proliferative endobronchosis, pulmonary edema, pulmonary *Halocercus*
8912	10/8/89	Gulf of Mexico, Sarasota Co., Casey Key, Beach Rd., Gulfside Beach Condo, North of Albee. Lat: 27°07′38" Long: 82°28′12"	8912-07	Monofilament wrapped around upper jaw. Possible hemolytic anemia.

FILE NUMBER	DATE	LOCATION	SLIDE #	DESCRIPTION
8915	10/14/89	Gulf of Mexico, Sarasota Co., 300 yds offshore about 1 mile north of Venice pier. Lat: 27°07'31" Long: 82°28'30"	8915-03 8915-08	Animal died from hemorrhage caused by a penetrating would of the heart caused by a sharp, knife-like object that entered at the sternal end of the 5th rib, punctured the right lung 3 times and the right ventricle of the heart twice. Possible monofilament marks on tail may indicate net entanglement.
9006	4/7/90	Gulf of Mexico, Manatee Co., Anna Maria Island, Bradenton Beach, 1900 Gulf of Mexico Dr. Lat: 27°28'32" Long: 82°42'15"	9006-16 9006-23 9006-32 9006-33	Rope marks on peduncle. Monofilament marks on rostrum and leading edges of right pectoral and fluke. Bruises on dorsal fin.
9007	5/19/90	Gulf of Mexico, Charlotte Co., Manasota Key, Englewood Beach, North of State Park Lat: 26°54'42" Long: 82°21'14"	9007-23	Abdomen slashed open by knife. Length of wound approximately 67 cm. Two ribs cut - anterior rib with two cuts, posterior cut angled and flat consistent with knife cut. The slash was made from animals right side, and indicates 2 separate cuts or redirection of the knife. Costocartilage indicates classical clean knife slash. Lungs small, deflated, possible due to penetration of cut into the cavity. Medical examiner could not determine pre- or post- mortem nature, but concluded that animal would have had to be immobilized in order for such a powerful cut to have been inflicted.
9008	6/18/90	Gulf of Mexico, Charlotte Co., South end of Manasota Key, floating in Stump Pass. Lat: 26°52'16" Long: 82°19'29"	9008-35	Possible rope marks and monofilament marks on fluke, peduncle, and head.

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